

SAFMAMS REVIEW OF THE ROLE OF SCIENCE IN COOPERATIVE FISHERIES MANAGEMENT

SUMMARY

Introduction

No change toward sustainable marine resource use can be carried out without the direct and open cooperation with stakeholders at all levels. Local stakeholders are the most important partners in this future work and researchers should open up their understanding of ecosystems to include human influence and resource use. The understanding of human behaviour in marine resource use includes bringing together natural scientific and social scientific perspectives; while at the same time incorporating experience based knowledge in scientific advice.

The *Review of the role of science in co-operative fisheries management* focuses on stakeholder perceptions of scientific advice, and how that advice is communicated. This summary document briefly addresses the scope and methods of the Review and then reports on key findings. The findings are divided into three sections: 1) Scientific knowledge at the local level; 2) General experiences from the study areas; 3) Management conflicts in the study areas. The report also provides some overall conclusions, which relate to key conflict issues, perceptions of scientific advice and problems transferring advice between scales.

Scope

SAFMAMS needs the input of local experiences and examples to understand the implications of scientific knowledge on local management efforts. Therefore, three key local fisheries management areas were chosen to provide a focus for the review:

1. The Wash and North Norfolk Coast European Marine Site (UK);
2. The Koster-Väderöfjord shrimp fishery (Sweden); and
3. The Pärnu Bay (Estonia).

These local study areas in the SAFMAMS project were selected to represent and exemplify areas where marine co-management is needed and/or used to mitigate the diverse interests in the area.

Methods

The conclusions drawn in the review are based on a combination of desk-top analysis and stakeholder interviews. First, in the desk-top phase, 188 research projects were analysed for their implications for local fisheries management and a large number of research reports and literature were studied to collect information on the use of scientific knowledge at a local scale.

Second, interviews were conducted with stakeholders in the three strategically selected study areas. Local representatives from three stakeholder groups were identified in each area. The representatives were considered to be key-informants due to their role in the management efforts; their knowledge and experience in the area; and/or their role as representatives for a specific group of stakeholders. 8-9 stakeholders were interviewed in each area.

The three main stakeholder groups were:

- Scientists and local managers
- Fishermen
- Local nature protection representatives (governmental or NGO), i.e. “greens”.

The main themes of conversation with local stakeholders were:

- What types of scientific advice is helpful in local co-management?
- What are the possibilities and problems in interfaces between scientific and experience based knowledge?
- How can scientific advice be improved to be of better use in local management?

During interviews, stakeholders involved in co-management around the Wash, the Koster-Väderö Fjorden and the Pärnu Bay were also asked to offer their reactions and comments to a draft version of the final review. Results from the local study areas are presented later on in this summary.

Key Findings

1. Scientific knowledge at the local level

The scales used in marine science have traditionally been based on single species perspectives. Local data collected was aggregated and generalised to give information on the general condition for the species. Even though the ecosystem approach is now increasingly in focus, there is still a tendency to focus on single species, and there is confusion regarding how to define the ecosystem. Management, on the other hand, is based on the human structures in society. Local management is based on local socio-cultural and economic structures (community-based). The knowledge needed at this level is specific: understanding changes in the local ecosystem – not entire species, but the interplay between human activity and local ecosystem factors. The advice needed at this level is highly local and should allow for quick adaptations to change (flexibility, response to change).

The scientific knowledge produced in research projects of the type considered in the review is very rarely used in the everyday management in the study areas. Instead, as the following descriptions of the use of science in the study areas illustrate, science officers closer to home supply the main sources of scientific information and advice.

1.1 The Wash, UK

In the Wash, management information is provided by the staff at Eastern Sea Fisheries Joint Committee (ESFJC) (yearly stock and catch assessments; information on general ecosystem changes; as well as landing information). English Nature carry out own research in the area to monitor ecosystem changes; map wetland species; and provide risk estimations for management purposes. English Nature will use scientific advice from the national level or from other regions if it is needed. This is possible due to the resources and structure of English Nature. No other stakeholders will supply their own scientific advice.

Research from national or international levels is very rarely used in ESFJC management. There are two main reasons for this:

- **Relevance.** The information needed to manage fisheries in the area is *specific and local* – the scientific advice presented in most of the reviewed projects has no direct bearing on the local level. To use them at the local level, they need to be translated or interpreted into the local context. The ESFJC has no resources to carry out this extensive work while at the same time producing the specific local information.
- **Access.** The scientific advice produced in research projects that could be relevant for the local management of the Wash is rarely easily accessible. Scientific advice is often presented in forms that are directed toward scientific audiences. It is time and resource consuming to keep up-to-date with all new scientific results, and often they will only be known within their own scientific realm. There is a risk that the information is not trickled down to the right persons (everyday users), should the information indeed be presented in stakeholder workshops or in other public fora.

1.2 Pärnu Bay, Estonia

In Pärnu Bay, management information is provided by the Estonian Marine Institute (EMI) (stock assessment; environmental impact assessment; and catch forecasts and management advice). No stakeholders provide their own scientific information.

EMI even supplies information for the Department of Fish Resources (DFR) at the Ministry of Environment. The department bases its management decisions on this information. The Estonian Marine Institute is the main Estonian academic authority on fishery and marine ecology. As opposed to the Eastern Sea Fisheries Joint Committee in the Wash, EMI has the scientific competence to put local research into an international scientific context. However, financial resources do not suffice to carry out such a task consequently.

1.3 Koster-Väderö Fjorden, Sweden

In Koster-Väderö Fjorden, management information is mainly provided by the Laboratory for Coastal Fishery (Kustfiskelaboratoriet); the Laboratory for Offshore Fisheries (Havsfiskelaboratoriet); or the Tjärnö Marine Biological Laboratory. The Laboratories for Offshore Fisheries and Coastal Fisheries are both research sections under the Swedish Board of Fisheries; whereas Tjärnö Marine Biological Laboratory is run in cooperation between the universities in Göteborg and Stockholm. Due to the close cooperation with universities and the national Board of Fisheries, relevant information from national and international research projects might be integrated into the local management advice, or dispersed to relevant local stakeholders. Still the same problems as mentioned in the Wash can be identified (relevance and access). The research is either commissioned by the Board of Fisheries or financed through national and international research projects. The regional administration in the area monitors the general marine ecosystem changes, but has no budget or competence for more in-depth research.

2. General experiences from all three the study areas

Several similarities between the three study areas were found regarding the use of scientific advice in local co-management. The Wash and Koster-Väderö are similar as to the fact that there are protected sites within the areas; and that there has been serious conflicts between resource users (fishermen) and nature conservationists (nature protection agencies and NGOs). Nature protection interests are mainly channeled through local divisions of national nature conservation agencies as well as through NGOs. As fisheries are separated from nature protection in the administration, nature protection interests are indeed able to fund their own research to contrast the fisheries perspective. In Pärnu Bay, on the other hand, there are almost no stakeholders representing the nature conservation side. It is thought that the Ministry of Environment, Department of Fish Resources, should incorporate nature protection into the management decisions; and that EMI is integrating nature protection in the fisheries data and management advice. The conflicts in Pärnu have been evolving more around human competition over resources; the most infected conflict recently solved was between recreational and professional fishermen.

Generally, the following similar theme-patterns were found in the three study areas:

- **Perceptions of scientific advice.** Scientific knowledge is generally met with skepticism from the fishermen's side. The information is considered to be biased by default. Traditionally, scientific knowledge has been the tool of central states and the authorities, and this has rubbed off on the fishers' perception of science. Lately, however, fishers have discovered that scientific advice can even benefit their own causes and perspectives. The fishers in the Wash and Koster-Väderö ask for more influence on the scientific advice produced for the area. They would like to be part of all aspects of the process, from research objectives to data collection and presentation. The Pärnu fishers seem less interested in being part of the process.
- **Increased stakeholder involvement in management.** To deal with the skepticism and unwillingness to cooperate, the managers in the Wash and Koster-Väderö have chosen to open up the process to local stakeholders. In these areas, it has been the conflicts between fishery

and nature protection that has developed the management system along the process. To solve the conflicts, the management structure has been forced to open up for the local stakeholders to find acceptance for the management strategies.

- **Cleavage between fisheries management and nature protection.** In all three areas there is a cleavage between fisheries management and nature protection. The management initiatives in the Wash and Koster-Väderö are attempts to deal with this cleavage. Still, nature protection interests are seen as separate entities by many of the stakeholders. The main reasons for this could be that research is often either directed towards fisheries sector or towards nature protection. The fact that local sections of the nature protection agencies are able to carry out own research to support their views is stressing the gap between the perspectives.
- **Experience based knowledge and social science.** Experience based knowledge (EBK) is rarely used directly in research at the local level. The scientists have a tendency to distrust the information from the local stakeholders, as they are afraid that stakeholders' interests color the information. Still, the management authorities in the Wash and Koster-Väderö seem interested in finding methods to incorporate local knowledge while at the same time keeping the scientific quality. The management authorities lack methods or examples of how the knowledge forms can be integrated. The fact that social scientific knowledge is very rarely applied at the local level could explain the lack of knowledge in this area. Only in the Koster-Väderö case were the stakeholders able to give examples of social scientific knowledge used at the local level for improving co-management. In the other study areas, social science was very absent.

When asked, all stakeholders agreed that social science could be useful in mitigating the management process. On the other hand, several of the stakeholders indicated that the social scientific knowledge needed was to be found within "common sense" and that no scientific experts are needed in that area.

- **Spreading of scientific advice to local stakeholders.** In all three study areas the main form of scientific advice comes in scientific reports. The reports are most often presented in two versions: one scientific and one public version. In the Wash and Koster-Väderö some of the information can even be found on the web sites. In the Wash, the ESFJC sends out data and reports to all individual fishermen and not through the fishers associations. This is done to avoid the political fractions that exist within the fishers associations, and because experiences in the area show that there is a discrepancy between perceptions brought forward by the associations and by the individual fishermen. The research results are even presented at open meetings with the industry in the Wash and Koster-Väderö.
- **Local needs and interests.** The fishers in the local areas ask for more information on the local ecosystem functions and changes. Generally, the fishers would like information that would allow for quick response to ecosystem changes. To do this, continued monitoring is needed, and specific research objectives should focus on specific ecosystem functions.

Local managers and nature conservation representatives, on the other hand, understand the fishers' need for quick responses. The managers in the Wash and Koster-Väderö seem open to a more pragmatic and responsive management method. The nature conservationists are more reluctant to accept more responsive methods, as this would threaten the precautionary principle. From the nature conservation side, it is stressed that ecosystem changes needs to be evaluated over time, and that international responsibilities (to protect endangered species etc.) are sometimes more important than local needs.

In Pärnu, further socioeconomic research is asked for, as it is needed to understand and solve the conflicts over human resource use in the area. Here, it is even more an issue that can be connected to rural development than in the other two study areas.

However, it is worth noting that the management efforts and methods in the three study areas differ from each other. The management efforts in the Wash seem to be more open to local participatory efforts than in Koster-Väderö and Pärnu. The board has an open structure and the fishermen are invited to question and challenge the scientific results. The Swedish efforts to create structures for local co-management are indeed striving for the same effect: to open up the local management process to a variety of stakeholders to create fast and grounded responses to local ecosystem changes and stakeholder interactions. Still, the initiative seems to be at a more basic stage and further work is needed. In contrast, the Estonian case exemplifies a situation where the centralised state structure is affecting the local management process. As a consequence of the financial and political situation in the Eastern European countries, resources for co-management are scarce at the local and regional level. Nature protection agencies and NGOs are still relatively weak in these countries, and the Estonian example from Pärnu Bay demonstrates this.

3. Main management conflicts in the study areas

Two key conflict themes have been identified during stakeholder interviews in the Wash, Pärnu Bay and Koster-Väderö Fjorden:

3.1 Marine resource use

The conflict types range from:

- Differences in opinion regarding choice of protected areas and restrictions used.
- Conflicts between precautionary principle (nature protection) and need for quick response (fishers' perspective).
- Conflicts between different human resource users in the area (commercial fishery versus recreational; fishery versus shipping or windmills; tourist activities versus industrial etc.).

3.2 Knowledge production and power

Here conflict types refer to a notion of hidden agenda in scientific knowledge production, a perceived nature protection bias in science:

- Differences in opinion regarding stock estimates and condition.
- Conflicts between local primary producers (fishermen) and national and international political and legislative structures.
- Conflicts over lack of influence on management plans.

Conclusions

There is a general problem with translating scientific advice produced in research projects to the local management level.

In all three study areas, stakeholders report that it is difficult to:

- Find scientific advice that is relevant to the local management situation. There are no resources at the local level to monitor and sort all scientific advice produced in international research projects for relevant knowledge to be used in local co-management.
- Translate scientific advice produced within research projects at a higher level (shared seas or larger ecosystem levels) to the local ecosystem. To take on such translation and adaptation of scientific advice, scientific resources are needed at the local level. The scientific officers working at the local level are not able to take on such tasks, as they are busy collecting and interpreting data from the local area.
- Compare experiences from other local management areas. Though there might be important lessons to be learned from other local management projects, it is difficult to find the time and resources to extract knowledge that can be transferred from one area to another. More cooperation between local-level management groups and institutions is wanted by the

stakeholders. Research projects that entail such knowledge (by comparing local cases or developing tools for knowledge transferral) are in high demand.

The fishers and managers in the three study areas prefer scientific advice and management methods that allow for quick adaptation to ecosystem changes; and they are particularly interested in forecasting, monitoring and understanding the local ecosystem and its changes.

The fishers and industry are rarely involved in planning the scientific research. The fishers would like that their experiences could be integrated more in scientific research and that they could be more involved in data collection etc. The Eastern Sea Fisheries Joint Committee has succeeded in building trust from the fishermen during the last decade. The Co-management initiative in Koster builds on an organization of stakeholders that has developed out of conflicts in the area. As part of the Co-management initiative courses are held for fishers in marine biology. The goal is to build trust between fishers and scientists, and to inform fishers of the methods used in research dealing with fisheries.

Nature conservation representatives, on the other hand, prefer scientific advice that has a precautionary quality. In their perspectives, ecosystem changes need to be monitored and evaluated over a longer time-period to be sure that it is valid. Here the need for pragmatic management and precaution collide – there is clearly a need for scientific and managerial methods for producing scientific knowledge at the local level for management purposes.

This need is generally not met by the research projects reviewed.

A way forward?

A central question for future fisheries research should be: *How do we create scientific advice that is scientifically valid, has a precautionary perspective and allows for adaptation to ecosystem changes?*

Based on the review, it can be concluded that funding resources should be directed towards efforts that will support and develop local management initiatives. This includes:

- Developing methods and systems to evaluate ecosystem change at the local management level. This entails research that will support quick response to local ecosystem changes (indicators or other ecosystem evaluators) while at the same time taking into account precautionary aspects.
- Developing methods for local co-management. (This includes pilot-projects as well as evaluation of existing projects as well as comparison of different methods.)
- Research that evaluates local management efforts. How are natural protection interests balanced with marine resource use? What can be done to improve local co-management?
- Developing methods and forum for knowledge exchange on local co-management. What lessons can be transferred from one local management situation to another?
- Developing methods for local stakeholders to gain access to scientific advice produced in research projects. Funding authorities should encourage local application of scientific advice by adding applicability at the local level as a priority. Further resources can be directed to help translate scientific results to the local management level.
- The subject of scale should be highlighted in all research projects, and further research is needed to analyse and support knowledge integration.
- Developing methods to analyse experience based knowledge as well as ways to incorporate this local knowledge in scientific advice.

The challenges facing science and funding authorities are indeed demanding. The marine resources are at stake. Still stakeholders at all levels, particularly at the local level, direct their efforts to find new methods for sustainable marine co-management. The scientific task is to monitor and support such sustainable development.